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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/630,111

07/30/2003

Otis G. Peterson

S-100,643

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35068

7590

03/27/2006

UNIVERSITY OF CALIFORNIA
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EXAMINER

PALABRICA, RICARDO J

ART UNIT

PAPER NUMBER

3663

DATE MAILED: 03/27/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/630,111

Applicant(s)

PETERSON, OTIS G.

Examiner

Rick Palabrica

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 December 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,8,11,18,19,21 and 25-29 is/are pending in the application.
- 4a) Of the above claim(s) 11 and 29 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,8,18,19,21 and 25-28 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 12 December 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. Applicant's 12/12/05 Amendment, which amended the specification, submitted a replacement drawing for Fig. 1, directly amended claims 1, 8, and 25-28, canceled claims 2-7, 12-17, 20 and 22-24, and traversed the rejection of claims in the 7/27/04 Office action, is acknowledged.
2. Applicant's amendment further limited the claims in order to define over the applied art in the 7/27/04 Office action. The previous claim 1, for example, which recited "a core comprising a fissile metal hydride" has been further limited to "a core consisting essentially of a powdered fissile metal hydride. Whereas the previous claim is directed to a generic metal hydride, i.e., no specific physical form of the hydride, the amended claim is now specific that the hydride is of powder form.

The current examiner agrees that the amended claims overcome the rejection based on the applied art in the 7/27/04 Office action. However, they still do not define over other prior art.

Additionally, the amended claims now recite a particular species of fissile metal hydride, i.e. powdered form, which raises a lack of an operative embodiment issue under 35 U.S.C. 101. The amendment also raises an issue under 35 U.S.C. 112, first paragraph, since the claimed invention to the powdered species is not supported by a well established utility and one skilled in the art clearly would not know how to use the claimed invention.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. The specification is objected to under 35 U.S.C. 112, first paragraph, as failing to provide an adequate written description of the invention and as failing to adequately teach how to make and/or use the invention, i.e., failing to provide an enabling disclosure.

As presently set forth in the amended claims, invention is directed to a nuclear reactor having a core consisting essentially of a powdered fissile metal hydride.

The disclosure is insufficient in failing to set forth, operative embodiments or examples of the invention, including parameters, such as the ratio of fissile to non-fissile material, required purity of the hydrogen atmosphere, fissile material and non-fissile material, surface area-to-volume requirement for the reactor, etc.

Applicant himself admits to said lack of operative embodiment as evidenced, for example, by the following statements in the specification:

- "While MCNP was used to evaluate the critical mass of the reactor configurations, these calculations were verified using the following scientific literature. H.C. Paxton et al., 'Critical Dimensions of Systems Containing U²³⁵, Pu²³⁹, U²³³, Los Alamos Scientific Laboratory Report TID-7028 (June 1964), have compiled extensive data on uranium criticality, mostly from experiments using highly enriched uranium diluted with water moderator. (Underlining provided). See page 14, lines 16+.
- "The 'C' curve for 4.9% enriched uranium is most appropriate for estimating the critical mass for this device. The line from 15 kg past 30 kg has been extrapolated from the published data and the critical mass for the hydride power source can be estimated from this extrapolation to be approximately 30 kg of U²³⁵

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for the H to U²³⁵ ratio of 61, which is characteristic of UH₃ enriched to 4.9%. This value is approximately double the critical mass measured for 93% enriched uranium hydride: G.A. Linenberger, et al., 'Enriched -Uranium Hydride Critical Assemblies,' *Nuclear Science and Engineering*: 7,44-57 (1960).

The experiments by Linenberger, et al., were performed on blocks of UH₃ that were fabricated from powdered UH₃ held together with a polymeric binder. Since the powder was bound with the polymer, no experiments could be performed to investigate the self-stabilizing potential of the UH₃ powder, active material. (Underlining provided). See page 15, lines 1+.

- "The physical dimensions of a practical device will depend on many important engineering factors and can be purposely manipulated in many ways. (Underlining provided). See page 15, lines 18+.
- "It is anticipated that a compact reactor according to this invention will be assembled and fueled at a factory and shipped to its installation point as a sealed unit." (Underlining provided). See page 21, lines 15+.

Clearly, applicant himself admits that no experiments with a powdered hydride were conducted to validate the results of calculations, extrapolations, etc. that were performed using non-powdered metal hydride data. Applicant also has not identified the many important engineering factors to be considered before a practical device can be built. Applicant's statement on "anticipated" compact reactor is clear evidence that such reactor is, at best, still being planned and has not been realized.

There is no evidence to indicate that the applicant has arrived at an operative system, i.e. that he has progressed his system beyond the point of an unproven theory or concept which still requires an undue amount of experimentation to enable the artisan to make and use the inventive system for its indicated purpose. This view is also considered supported by the failure to set forth a full example of the specific parameters of an operative embodiment. One cannot rely on the skill in the art for the selection of the proper quantitative values to present an operative system, since those

in the art do not know what would be these values. See Bank v. Rauland Corp., 64 U.S.P.Q. 93; In re Comeil et al., 145 U.S.P.Q. 697.

It is thus considered that the examiner (for the reasons set forth above) has set forth a reasonable and sufficient basis for challenging the adequacy of the disclosure. The statute requires the applicant itself to inform, not to direct others to find out for themselves; In re Gardner et al, 166 U.S.P.Q. 138, In re Scarborough, 182 U.S.P.Q. 298. Note that the disclosure must enable a person skilled in the art to practice the invention without having to design structure not shown to be readily available in the art; In re Hirsch, 131 U.S.P.Q. 198.

Claim Rejections - 35 USC § 101

35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

4. Claims 1, 8, 18, 19, 21 and 25-28 are rejected under 35 U.S.C. 101 because the disclosed invention is inoperative and therefore lacks utility.

The reasons that the invention as disclosed is inoperative are the same as the reasons set forth in section 3 above as to why the specification is objected to and the reasons set forth in section 3 above are accordingly incorporated herein.

The applicant at best, has set forth what may be considered a concept or an object of scientific research for the indicated species of powdered metal hydride. However, it has been held that such does not present a utility within the meaning of 35 U.S.C. 101. See Brenner v. Manson, 148 U.S.P.Q. 689.

Additionally, it is well established that whereas here, the utility of the claimed invention is based upon allegations that border on the incredible or allegations that would not be readily accepted by a substantial portion of the scientific community, sufficient substantiating evidence of operability must be submitted by applicant. Note In re Houghton, 167 U.S.P.Q. 687 (CCPA 1970); In re Ferens, 163 U.S.P.Q. 609 (CCPA 1969); Puharich v. Brenner, 162 U.S.P.Q. 136 (CA DC 1969); In re Pottier, 152 U.S.P.Q. 407 (CCPA 1967); In re Ruskin, 148 U.S.P.Q. 221 (CCPA 1966); In re Citron, 139 U.S.P.Q. 516 (CCPA 1963); and In re Novak, 134 U.S.P.Q. 335 (CCPA 1962).

Claim Rejections - 35 USC § 112

5. Claims 1, 8, 18, 19, 21 and 25-28 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

The reasons that the inventions as disclosed are not enabling are the same as the reasons set forth in section 3 above as to why the specification is objected to and the reasons set forth in section 3 above are accordingly incorporated herein.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 1, 8, 18, 19, 21 and 25-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over H. von Ohain et al. (U.S. 3,618,322) in view of Burke (U.S. 3,156,747). H. von Ohain et al. disclose the applicant's claims except for the metal hydride.

H. von Ohain et al. teach a nuclear reactor having a core of fissionable material in a powdered state that is exposed to a stream of gaseous hydrogen (see Figs. 1 and 2, and col. 1, lines 62+).

Burke teaches compacts for neutronic systems, which compacts include a predetermined ratio of hydrogen to metals such as uranium, plutonium and their compounds. He states that combinations of hydrogen and uranium have become of great importance because hydrogenous material is effective in slowing down neutrons to an energy at which uranium has a large cross section. He further highlights uranium hydride to be an optimum combination of uranium and hydrogen because it furnishes considerably higher densities than other combinations (see col. 1, lines 10+). Since no neutronic system utilizes 100% enriched uranium, Burke's uranium hydride inherently includes both fissile U^{235} along with some non-fissile U^{238} .

Note that H. von Ohain et al. teaches the use of a fissionable material for a nuclear reactor and the compacts that Burke teach are for specific use in neutronic systems that include nuclear reactors. Thus, both references are in the same field of endeavor.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the apparatus, as disclosed by H. von Ohain et al., by the teaching of Burke, to use uranium hydride for the fissionable material, to gain the advantages thereof (i.e., higher density and more compact reactor system), because such modification is no more than the use of a well-known nuclear fuel material within the nuclear art.

Applicant's claim language reads on the H. von Ohain et al.-Burke apparatus as follows (see Figs. 1-3 in von Ohain et al.): a) "powdered fissile material" reads on the fissile U^{235} material inside the reactor cavity C (see col. 2, lines 52+); b) "non-fissile material" reads on: (i) return conduit 30, i.e., for claim 1; or (ii) the non-fissile U^{238} material outside the reactor cavity C, e.g., in separator 20, i.e., for claim 1 and/or claim 19 (see col. 3, lines 3+); c) "means for controlling the non-fissile material temperature" reads on additional hydrogen gas admitted into the separator through slots 32, to reduce the wall temperature of the separator (see col. 3, lines 37+); d) "plurality of trays holding non-fissile material" reads on the two separators 20 in the embodiment shown in Fig. 3.

Conclusion

7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

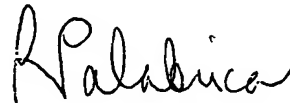
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rick Palabrica whose telephone number is 571-272-6880. The examiner can normally be reached on 6:30-5:00, Mon-Thurs.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jack Keith can be reached on 571-272-6878. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

RJP
March 20, 2006

A handwritten signature in black ink, appearing to read "R. Paladino". The signature is written in a cursive style with a large initial "R" and a stylized "P".